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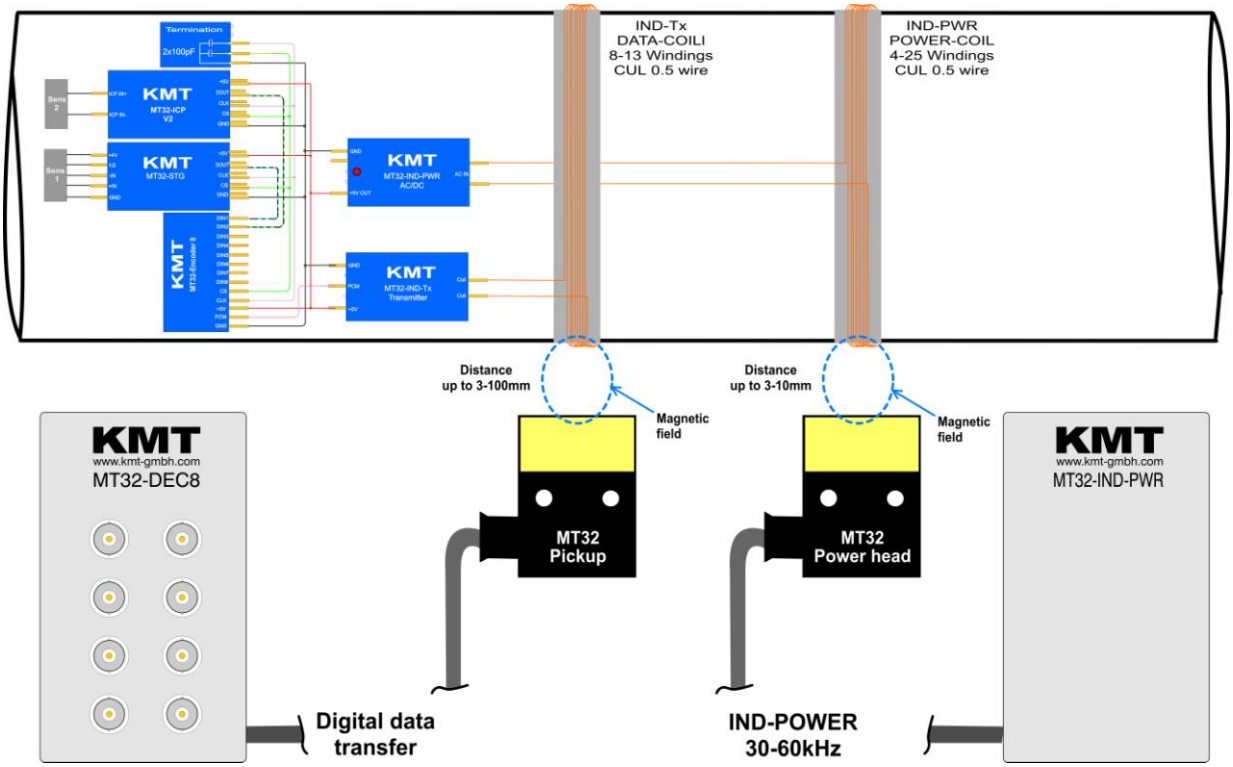
MT32 Telemetry

Multi channel telemetry system for rotating application

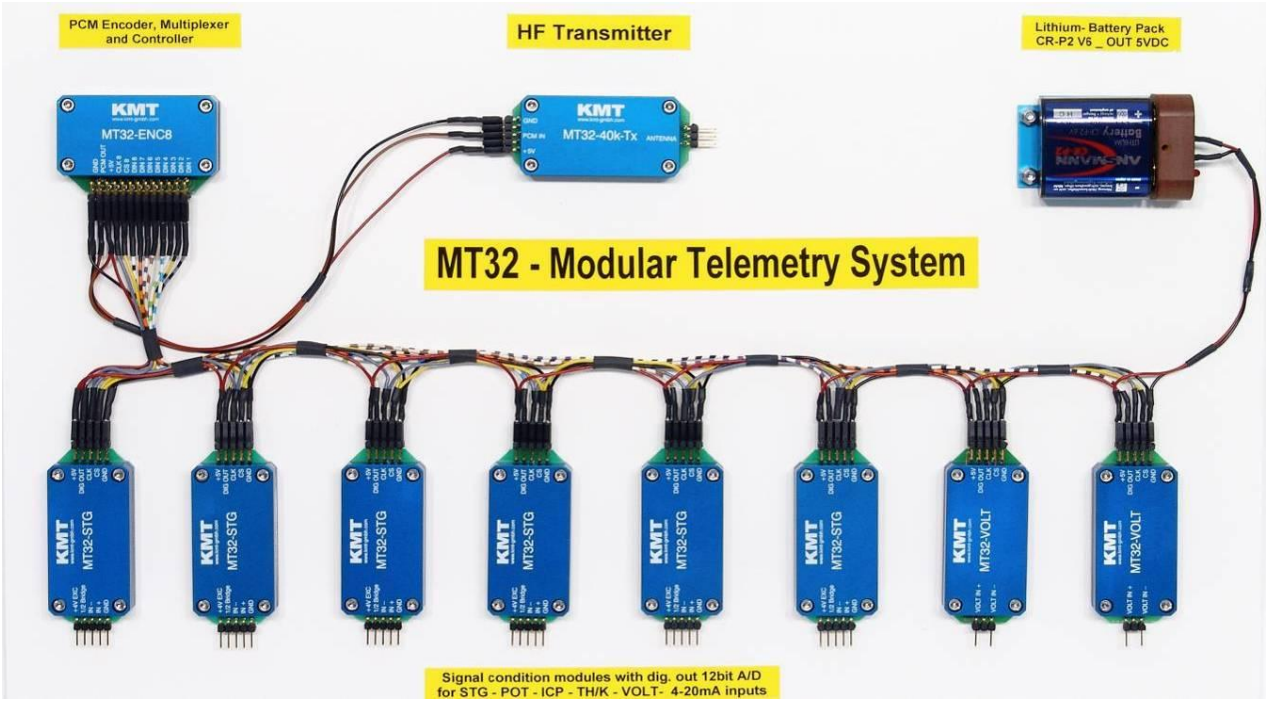
- Up to 32 channel
- Sensor inputs for STG, POT, TH-K, Pt100, 4-20mV, ICP or VOLT
- STG - Auto Zero calibration
- Anti aliasing filters
- 12 bit ADC resolution
- Signal bandwidth up to 0…24000Hz
- Powering (rotor) by battery or inductive
- Digital inductive or radio transmission
- Distance up to 10m (Radio Tx)
- Easy to assemble and operate
- Output +/-5V add. 4-20mA (Option)
- System accuracy <0.25%
- Digital PCM interface for PC

Short description:

The MT32 Mini-Telemetry is a very small and flexible telemetry system for rotating, mobile and stationary applications. Each sensor module is equipped with signal conditioning, anti-aliasing filters, analog-to-digital converters and a digital output. All these up to 32 modules will controlled by an encoder (multiplexer with PCM output) module. By this concept it's possible to install the acquisition modules close to the sensor to have short connections for the analog sensor lines. This avoids an undesired coupling of disturbances resulting in noisy signals. The interference insensitive digital outputs then can lead over wider distances of up to 1m to the encoder module. The encoder output is a PCM bit stream signal which can be modulated for emission by a transmitter module for a distances of up to 10m. Suitable for wireless data transmission rates of 40kbit/s up to 2560kbit/s.



example with inductive power and inductive data transmission



example with 8-channels (rotation part)

MT32 acquisition modules

52 x 27 x 11 mm
Weight 20 grams

MT32-STG V1
For strain gages
Full and half (≥350Ω)
(quarter bridge only with external completions resistor!)
Fixed excitation 4V DC
Offset calibration via potentiometer or optional auto-zeroing
Gain 200 or 1000
Anti aliasing filter
Resolution 12bit = 72dB dynamic range
Accuracy <0.25%
Consumption of current: 20mA

52 x 27 x 11 mm
Weight 20 grams

MT32-POT
For all potentiometer values
350Ohm to 10kOhm
Excitation:4 VDC (fixed)
Resolution 12bit = 72dB dynamic range
Anti aliasing filter
Accuracy <0.25%
Consumption of current:20mA

52 x 27 x 11 mm
Weight 20 grams

MT32-STG V2
For strain gages
Full and half (≥350Ω)
(quarter bridge only with external completions resistor!)
Fixed excitation 4V DC
Offset calibration via potentiometer or optional auto-zeroing
Gain: **250-500-1000-2000** or
1000-2000-4000-8000
Specify at order
Anti aliasing filter
Resolution 12bit = 72dB dynamic range
Accuracy <0.25%
Consumption of current: 26mA

52 x 27 x 11 mm
Weight 20 grams

MT32-PT100
For thermo resistors
Range -100 …+500 °C
Resolution 12bit = 72dB dynamic range
Accuracy <0.25%
Consumption of current:5mA

52 x 27 x 11 mm
Weight 20 grams

MT32-ICP
For ICP® sensor inputs
(Max. input range at gain 2x = ±2.5V)
Current exc. **4mA** (optional 1mA)
Signal gain x 2, 4, 8, 16 and 32
(optional x 1, 2, 4, 8 and 16)
Signal bandwidth 3 Hz up to 12000Hz*
(*dependent of the max. cut of frequency)
Resolution 12bit = 72dB dynamic range
Accuracy <0.25%
Consumption of current: 50mA

52 x 27 x 11 mm
Weight 20 grams

MT32-VOLT
For high level inputs ±5V or ±10V
Resolution 12bit = 72dB dynamic
Accuracy <0.25%
Consumption of current: 10mA

Optional Volt ISO available with galvanic isolated inputs

52 x 27 x 11 mm
Weight 20 grams

MT32-TH K-ISO
For thermo couples type K
(with galvanic isolation!)
Range -50 to 1000 °C
(other range on request)
Resolution 12bit = 72dB dynamic range
Bandwidth 0-10Hz
Accuracy <1%
Consumption of current:12mA

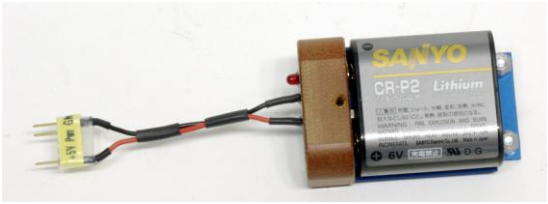
MT32 power supply rotating part

52 x 27 x 11 mm
Weight 20 grams

DC/DC PWR-5V-1000
Input **7…30V DC**
Output 5V DC
Max. current 1000mA

Lithium battery from SAFT:
2xLSH14, 3.6V each, 5800mAh
2x 3.6V = 7.2V with 5800mAh
or
2x LSH20, 3.6V each, 13000mAh
2x 3.6V = 7.2V with 13000mAh

This is only a recommendation!
The use of lithium batteries follow at one's own risk!!



58 x 35 x 21 mm
Weight about 60gram

MT32-BATT-PACK
Input 6V via Lithium battery
CR-P2 6V 1500mA/h
Output 5V DC
Low BATT LED display
Max. current 300mA

This is only a recommendation!
The use of lithium batteries follow at one's own risk!!

IND-Pwr-AC/DC module

52 x 27 x 11 mm
Weight 20 grams

MT32- inductive AC/DC PWR 5V
Input AC 20-30kHz
Output 5V DC
Max. current 500mA

For inductive IND-PWR AC/DC module is an additional power supply necessary!

MT32 encoder and decoder

52 x 27 x 11 mm
Weight 20 grams

MT32-ENC8
PCM encoder module for linking the data of up to 8 SC modules to one PCM bit stream for transmission
Consumption of current: 20mA

65 x 105 x 230 mm - Weight 1000 grams

MT32-DEC8
Receiver for up to 2, 4 or 8 channels
±5V output range on female BNC
Total system accuracy ±0,25%
without sensors
Powering 10–30V DC or
optional 110-230V AC (50Hz-60Hz)
with AC/DC adaptor

52 x 27 x 11 mm
Weight 20 grams

MT32-ENC16
PCM encoder module for linking the data of up to 16 SC modules to one PCM bit stream for transmission.
Consumption of current: 20mA

MT32-DEC16
65 x 105 x 230 mm
Weight 1000 grams

Option :BNC16

MT32-DEC16
Receiver for 16 channels
±5V output range
Output 37pol. Sub D
Total system accuracy ±0,25%
without sensors
Powering 10–30V DC or
optional 110-230V AC
with AC/DC adaptor

Option: BNC16, adaptor Box
37 Sub-D to 16 x BNC Outputs

MT32 transmitter module

52 x 27 x 11 mm
Weight 20 grams

MT32-IND-Tx-2560k
Inductive data transmission transmitter
Total sampling rate 160 kS/s
Transmission rate 2560kbit/s
Distance up to 0.1m (>100mm)
Consumption of current: 15mA

52 x 27 x 11 mm
Weight 25 grams

MT32-IND-Tx-45MHz-2560k
Inductive data transmission transmitter with 45MHz carrier
(for noise environmental areas!)
Total sampling rate 160 kS/s
Transmission rate 2560kbit/s
Distance up to 0.1m (>100mm)
Consumption of current: 70mA

52 x 27 x 11 mm
Weight 23 grams

MT32-40k (320-640-1280k available)
Range 10m on rotating applications.
Total scanning rate 2,5 kS/s
Transmission rate 40kbit/s
Transmission power 10mW
Consumption of current: 40mA

Cut off frequency from anti-aliasing filter (-3dB), scanning rate (red), latency time (brown) analog IN/OUT

Bit rate	2 Channels	4 Channels	8 Channels	16 Channels	32 Channels
2560 kbit/s	24000Hz (91428 Hz) 0.079ms	12000 Hz (49231 Hz) 0.149ms	6000 Hz (25600 Hz) 0.29ms	3000 Hz (13061Hz) 0.56ms	1500 Hz (6598Hz) 1.108ms
1280 kbit/s	12000 Hz (45714 Hz) 0.154ms	6000 Hz (24615 Hz) 0.295ms	3000 Hz (12800 Hz) 0.57ms	1500 Hz (6530 Hz) 1.11ms	750 Hz (3298 Hz) 2.23ms
640 kbit/s	6000 Hz (22857Hz) 0.305ms	3000 Hz (12308 Hz) 0.578ms	1500 Hz (6400 Hz) 1.12ms	750 Hz (3265 Hz) 2.24ms	375 Hz (1649 Hz) 4.6ms
320 kbit/s	3000 Hz (11428 Hz) 0.597ms	1500 Hz (6154 Hz) 1.14ms	750 Hz (3200 Hz) 2.26 ms	375 Hz (1632 Hz) 4.64ms	190 Hz (824 Hz) 9.1ms
40 kbit/s	375 Hz (1428 Hz) 4.9ms	190 Hz (770 Hz) 9.4ms	95 Hz (400 Hz) 17.8ms	47 Hz (204 Hz) 35,0ms	23 Hz (103 Hz) 69.3ms

Scanning rate, signal bandwidth and frame length depending on bit rate and number of channels

Frame example with 8 channels as following: 8Ch x12 bit = 96 bit + 4 bit sync. = 100 bit

1x data frame

1 Ch.	2 Ch.	3 Ch.	4 Ch.	5 Ch.	6 Ch.	7 Ch.	8 Ch.	Sync. bit	
12 bit	12 bit	12 bit	12 bit	12 bit	12 bit	12 bit	12 bit	4 bit	= bit rate100 bit

32 Ch. x 12 bit = 384 bit + 4 bit sync. = 388 bit
16 Ch. x 12 bit = 192 bit + 4 bit sync. = 196 bit
8 Ch. x 12 bit = 96 bit + 4 bit sync. = 100 bit
4 Ch. x 12 bit = 48 bit + 4 bit sync. = 52 bit
2 Ch. x 12 bit = 24 bit + 4 bit sync. = 28 bit

Scanning you can calculate e.g.: 40kbit transfer rate, 8 Ch. = 40000 : 100bit = 400Hz per Ch.

Technical Data are subject to change without notice!

Environmental:

Rotating Part (blue modules):

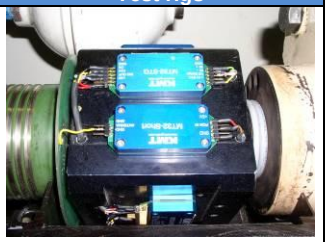
- Operating Temperature ..... -20 – +80°C
- Storage Temperature ..... -30 – +90°C
- Humidity (non-condensing) ..... 20 – 80%
- Vibration ..... 5g Mil standard 810C, curve C
- Shock & static acceleration (in any direction) 3000g

Down load formula (Excel format) to calculate the static acceleration (RPM/diameter):
http://www.kmt-gmbh.com/en/telemetrie/Calculation of radial acceleration of shaft.xls

Receiving Part:

- Operating Temperature ..... -10 – +70°C
- Storage Temperature ..... -20 – +80°C
- Humidity (non-condensing) ..... 20 – 80%
- Vibration ..... 5g Mil standard 810C, curve C
- Shock (in any direction) 100g

Application

Streetcar wheel	Railway wheel	Railway wheel	Railway wheel
Belt disk of car	**Drive shaft of ship engines**	**Shaft of wind power plant**	**Test rigs**
			
Drive shaft of wheel loader	**Force measurements**	**24kHz data transmission TTL**	**Special solution for force test at milling machine**

Item	Qty.	Type	Description
8a			Order Samples
			MT32-2CH-40k, 2xSTG, BATT, BW 2x0-375Hz
	2	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-40k-10	ISM-Band telemetry transmitter and receiver (distance up to 0.5 to 10m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC2	Decoder for 2 channels, Output 2 x BNC
	1	AC/DC	AC/DC power supply for DEC2 (Optional)
			MT32-2CH-IND-TX-RX, 2xSTG, BATT, BW 2x0-24000Hz
	2	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC2	Decoder for 2 channels, Output 2 x BNC
	1	AC/DC	AC/DC power supply for DEC2 (Optional)
			MT32-4CH-40k, 4xSTG, BATT, BW 4x0-190Hz
	4	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-40k-10	ISM-Band telemetry transmitter and receiver (distance up to 0.5 to 10m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC4	Decoder for 4 channels, Output 4 x BNC
	1	AC/DC	AC/DC power supply for DEC4 (Optional)
			MT32-4CH-IND-TX-RX, 4xSTG, BATT, BW 4x0-12000Hz
	4	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC4	Decoder for 4 channels, Output 4 x BNC
	1	AC/DC	AC/DC power supply for DEC4 (Optional)
			MT32-8CH-40k, 8xSTG, BATT, BW 8x0-95Hz
	8	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-40k-10	ISM-Band telemetry transmitter and receiver (distance up to 0.5 to 10m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC8	Decoder for 8 channels, Output 8 x BNC
	1	AC/DC	AC/DC power supply for DEC8 (Optional)

Item	Qty.	Type	Description
8b			Order Samples
			MT32-8CH-IND-TX-RX, 8xSTG, BATT, BW 8x0-6000Hz
	8	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC8	Decoder for 8 channels, Output 8 x BNC
	1	AC/DC	AC/DC power supply for DEC8 (Optional)
			MT32-8CH-IND-TX-RX, 8xSTG, BATT, BW 8x0-6000Hz, DIG-OUT only Digital OUT, with interface and software
	8	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC-DIG	Decoder with only digital output for IF16 or ECIA100
	1	ECIA100	Digital interface for notebook (IF16-PCMCIA)
	1	MLab	32bit data acquisition and on-line processing software for WinXP/2000
	1	MGraph	32bit data analysis software for WinXP/2000 (option)
	1	AC/DC	AC/DC power supply for DEC-DIG (Optional)
			MT32-8CH-IND-TX-RX, 8xSTG, IND-PWR, BW 8x0-6000Hz
	8	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	IND-PWR-L	Inductive power supply
	1	MT32-DEC8	Decoder for 8 channels, Output 8 x BNC
	2	AC/DC	AC/DC power supply (1x for DEC8, 1x for IND-PWR)
			MT32-8CH-IND-TX-RX 6xSTG, 2 x ICP, BATT, BW 8x0-6000Hz
	6	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	2	MT32-ICP	Signal conditioning module for ICP sensors with digital data acquisition
	1	MT32-ICP-Pwr	Power module for MT32-ICP
	1	MT32-ENC8	Encoder for up to 8 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	BATT-PACK	Battery pack
	1	BATT-SET	Battery set
	1	MT32-DEC8	Decoder for 8 channels, Output 8 x BNC
	1	AC/DC	AC/DC power supply
			MT32-16CH-IND-TX-RX 16xSTG, BATT, BW 16x0-3000Hz
	16	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC16	Encoder for up to 16 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	DC/DC PWR-5V-500	Power modul for blue modules, IN 7-30V OUT 500mA 5VDC
	1	MT32-DEC16	Decoder for 16 channels, Output via 37pol. Sub-D Connector
	1	BNC16 BOX	Adapter BOX for DEC16 multiple 37pole Sub-D to 16 single BNC connectors
	1	AC/DC	AC/DC power supply

Item	Qty.	Type	Description
8c			Order Samples
			MT32-16CH-IND-TX-RX 16xSTG, BATT, BW 16x0-3000Hz
			only Digital OUT, with interface and software
	16	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC16	Encoder for up to 16 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	DC/DC PWR-5V-500	Power modul for blue modules, IN 7-30V OUT 500mA 5VDC
	1	MT32-DEC-DIG	Decoder with only digital output for IF16 or ECIA100
	1	ECIA100	Digital interface for notebook (IF16-PCMCIA)
	1	MLab	32bit data acquisition and on-line processing software for WinXP/2000
	1	MGraph	32bit data analysis software for WinXP/2000 (option)
	1	AC/DC	AC/DC power supply
			MT32-16CH-IND-TX-RX, 16xSTG, IND-PWR, BW 16x0-3000Hz
	16	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC16	Encoder for up to 16 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	IND-PWR-XL	Inductive power supply
	1	MT32-DEC16	Decoder for 16 channels, Output via 37pol. Sub-D Connector
	1	BNC16 BOX	Adapter BOX for DEC16 multiple 37pole Sub-D to 16 single BNC connectors
	2	AC/DC	AC/DC power supply (1x for DEC16, 1x for IND-PWR)
			MT32-16CH-40k, 16xSTG, BATT, BW 16x0-47Hz
	16	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC16	Encoder for up to 16 acquisition module
	1	MT32-40k-10	ISM-Band telemetry transmitter and receiver (distance up to 0.5 to 10m)
	1	DC/DC PWR-5V-500	Power modul for blue modules, IN 7-30V OUT 500mA 5VDC
	1	MT32-DEC16	Decoder for 16 channels, Output via 37pol. Sub-D Connector
	1	BNC16 BOX	Adapter BOX for DEC16 multiple 37pole Sub-D to 16 single BNC connectors
	1	AC/DC	AC/DC power supply for DEC16 (Optional)
			MT32-32CH-IND-TX-RX, 32xSTG, BATT, BW 32x0-1500Hz
	32	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC32	Encoder for up to 32 acquisition module
	1	MT32-40k-10	ISM-Band telemetry transmitter and receiver (distance up to 0.5 to 10m)
	1	DC/DC PWR-5V-1000	Power modul for blue modules, IN 7-18V OUT 1000mA 5VDC
	1	MT32-DEC32	Decoder for 32 channels, Output via 37pol. Sub-D Connector
	1	BNC32 BOX	Adapter BOX for DEC32 multiple 37pole SubD to 32 single BNC connectors
	1	AC/DC	AC/DC power supply for DEC32 (Optional)
			MT32-32CH-IND-TX-RX, 32xSTG, IND-PWR, BW 32x0-1500Hz
	32	MT32-STG	Signal conditioning module for strain gages with digital data acquisition
	1	MT32-ENC32	Encoder for up to 32 acquisition module
	1	MT32-IND-RX-TX	Inductive telemetry 2560kbit transmitter and receiver (distance 0.1m)
	1	IND-PWR-XXL	Inductive power supply
	1	MT32-DEC32	Decoder for 32 channels, Output via 37pol. Sub-D Connector
	1	BNC32 BOX	Adapter BOX for DEC32 multiple 37pole SubD to 32 single BNC connectors
	1	AC/DC	AC/DC power supply for DEC32 (Optional)